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## A Consultation Phone Service for Patients With Total Joint Arthroplasty May Reduce Unnecessary Emergency Department Visits

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## ABSTRACT

**Background:** Different measures for reducing costs after total joint arthroplasty (TJA) have gained attention lately. At our institution, a free-of-charge consultation phone service was initiated that targeted patients with TJA. This service aimed at reducing unnecessary emergency department (ED) visits and, thus, potentially improving the cost-effectiveness of TJAs. To our knowledge, a similar consultation service had not been described previously. We aimed at examining the rates and reasons for early postdischarge phone calls and evaluating the efficacy of this consultation service.

**Methods:** During a 2-month period, we gathered information on every call received by the consultation phone service from patients with TJAs within 90 days of the index TJA procedure. Patients were followed for 2 weeks after making a call to detect major complications and self-initiated ED visits. Data were collected from electronic medical charts regarding age, gender, type of surgery, date of discharge, and length of hospital stay.

**Results:** We analyzed 288 phone calls. Calls were mostly related to medication (41%), wound complications (17%), and mobilization issues (15%). Most calls were resolved in the phone consultation. Few patients (13%) required further evaluation in the ED. The consultation service failed to detect the need for an ED visit in 2 cases (0.7%) that required further care.

**Conclusion:** The consultation phone service clearly benefitted patients with TJAs. The service reduced the number of unnecessary ED visits and functioned well in detecting patients who required further care. Most postoperative concerns were related to prescribed medications, wound complications, and mobilization issues.

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The demand for total joint arthroplasty (TJA) has increased substantially during the last few decades, and the number of TJA procedures is expected to increase in the future [1]. To counter rising healthcare costs, emphasis must be placed on managing unnecessary emergency department (ED) visits and hospital readmissions. In particular, ED visits that occur during the first months after primary discharge are targeted, because complications that occur during this time are thought to be the best reflection of the quality of care.

The average hospital length of stay after a TJA has been reduced [2]; the widely used fast-track setting allows patients with TJAs to be safely discharged on the second or third postoperative day

[3,4]. This trend of shorter inpatient stays has accentuated the importance of patient education before discharge. A large proportion of ED visits are potentially unnecessary and may be prevented with better patient education and enhanced outpatient communication [5].

At our institution, a consultation phone service was initiated to target patients with TJAs, in an effort to reduce the amount of unnecessary postdischarge ED visits. Patients undergoing a TJA procedure are given both verbal and written instructions on how and when to contact this free-of-charge TJA consultation service. The phone service is believed to reduce the rate of unnecessary postdischarge hospital visits, but the real effects of this service remain unclear.

To our knowledge, no study has described or evaluated a similar phone service. Therefore, our primary purpose in the present study was to examine the rates and reasons for early postdischarge phone calls to our TJA consultation service. Our secondary aim was to evaluate the functionality of the consultation service, that is, to determine how well the phone service detected patients who required further care. We hypothesized that the consultation service would be contacted more frequently for some reasons than for other reasons. Thus,

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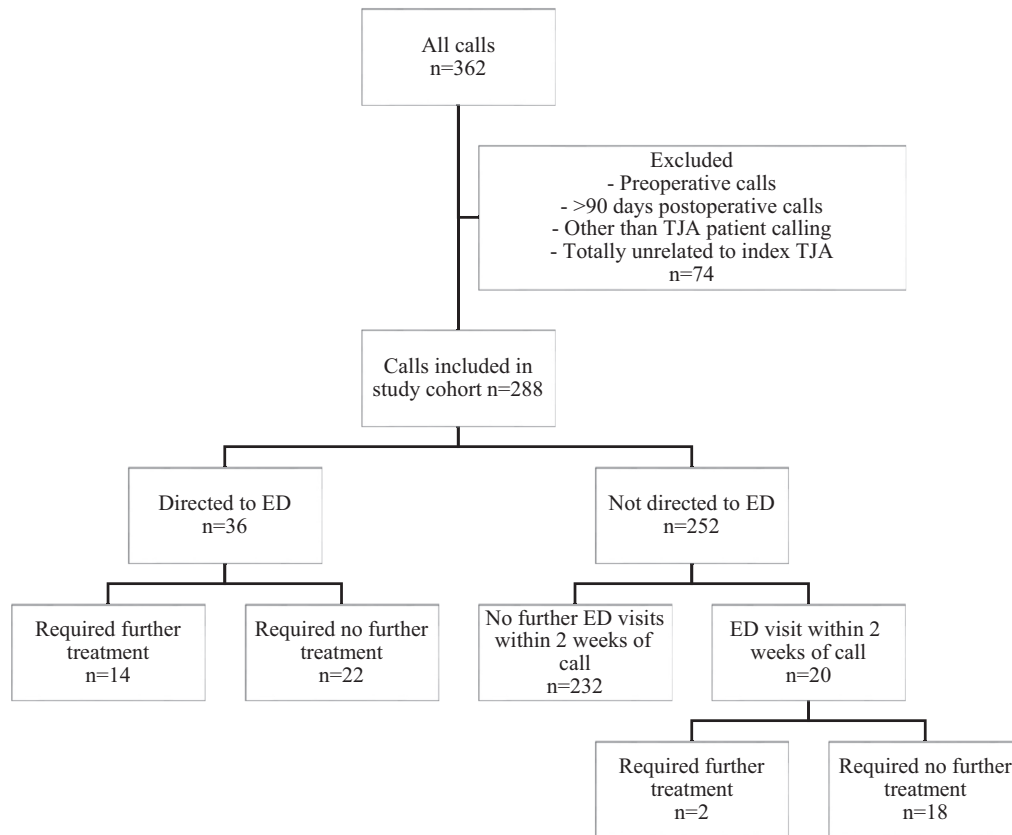


Fig. 1. Flowchart of study patients. TJA, total joint arthroplasty; ED, emergency department.

our analysis might provide information on ways to improve standardized healthcare procedures in fast-track TJA.

## Materials and Methods

All TJAs at our high-volume tertiary care center are performed according to a standardized fast-track protocol. Patients are mobilized on the day of surgery and are discharged when they meet discharge criteria, usually on postoperative day 2. In 2015, there were 996 total knee arthroplasties (TKAs; 894 primaries and 102 revisions) and 1144 total hip arthroplasties (THAs; 874 primaries and 270 revisions) performed at our institution. The procedures were performed by a total of 14 senior orthopedic surgeons specialized in hip and knee arthroplasty.

Before the surgery, every patient visited both a physiotherapist and a nurse experienced in total arthroplasty care. Both verbal and written instructions were given on how to prepare for the surgery and how the rehabilitation should be performed. Together with a nurse, the patients completed a preoperative form with questions about prior surgeries, current medications, comorbidities, and conditions at home. After the surgery, the patients were mobilized as soon as possible, typically on the day of surgery, and they received physiotherapy daily during the hospital stay. The patients were discharged on the second or third postoperative day, when they reached independent functional status (ie, they could walk a short distance, dress independently, and go to the toilet without assistance) and their pain level was controlled. At discharge, the patients were given both verbal and written instructions on how and when to contact the consultation phone service. Every patient also received a 30-page guide with rehabilitation exercises and instructions regarding wound care, pain medication use, prevention of deep vein thromboses, and treatment

of swelling and hematomas. These issues were also covered verbally before discharge, as part of the standard discharge protocol.

At our institution, both THA and TKA patients receive similar instructions regarding use of pain medication. Patients are instructed to reduce pain medication gradually as the pain subsides, and that pain should not prevent mobilization or disturb sleep. Similarly, both THA and TKA receive rehabilitation instructions that only differ regarding the specific joint.

For this study, we prospectively gathered information about all phone calls received by our TJA consultation phone service between March 30, 2016, and May 31, 2016. The phone service was open every weekday, from noon to 1 PM, and it was operated by trained nurses. The nurses who answered the phone were instructed to complete a detailed form after every call during the 2-month study period. The information collected on this form included name, date of call, main reasons for contact, and actions taken to resolve the patient's concerns. The data collection form was completed by selecting predetermined response categories. The following alternatives were provided for the main reason for the call: pain medication, wound complication, sick leave issues and other paperwork, edema, extensive bruising or hematoma, deep vein thrombosis suspicion, constipation, or mobilization- or coping-related issues. The following alternatives were provided regarding the actions taken to resolve the concern: instructions given by phone, consultation with a nurse specialized in pain medication, consultation with the attending physician, patient instructed to visit the ED, patient instructed to visit a primary care institution, or other action. If the nurse was unable to address the concerns raised by the patient, for pain medication-related issues, she would consult a nurse specialized in pain management, otherwise the treating surgeon. The nurse only instructed the patient to visit the ED after consulting the treating surgeon. In

**Table 1**  
Call Reasons Per Category.<sup>a</sup>

| Call Reason                           | N, All Calls | % of Calls | N, Patients Instructed to Visit ED | N, Calls by TKA Patients | N, Calls by THA Patients |
|---------------------------------------|--------------|------------|------------------------------------|--------------------------|--------------------------|
| Medication                            | 128          | 41         | 3                                  | 84                       | 44                       |
| Wound problem                         | 53           | 17         | 17                                 | 28                       | 25                       |
| Mobilization                          | 46           | 15         | 2                                  | 25                       | 21                       |
| Edema                                 | 34           | 11         | 7                                  | 16                       | 18                       |
| Miscellaneous reasons                 | 13           | 4          | 3                                  | 5                        | 8                        |
| Questions about paperwork             | 10           | 3          | 0                                  | 8                        | 2                        |
| Hematoma                              | 9            | 3          | 0                                  | 3                        | 6                        |
| DVT suspicion                         | 7            | 2          | 4                                  | 4                        | 3                        |
| Question about outpatient visit times | 6            | 2          | 0                                  | 3                        | 3                        |
| Laboratory result inquiries           | 5            | 2          | 0                                  | 2                        | 3                        |
| Constipation                          | 2            | 1          | 0                                  | 1                        | 1                        |

ED, emergency department; TKA, total knee arthroplasty; THA, total hip arthroplasty; DVT, deep vein thrombosis.

<sup>a</sup> One patient call can be categorized as more than one call reason.

addition, the nurses were encouraged to write a short description of each call.

This study included all calls from patients who had undergone a primary or revised THA or TKA procedure at our institution within 90 days before the call. Calls were excluded from this study when they were received later than 90 days after the index procedure, were received before a planned TJA procedure, were made by the patient's relatives, or were not in any way related to the index TJA procedure.

We used electronic medical records to gather information about age, gender, type of surgery (THA or TKA, primary, or revision), date of surgery, and date of discharge. The hospital length of stay was also determined. Patients who were instructed to visit the ED based on their call were followed up to record the diagnostic evaluation, procedures performed in the ED, and possible hospital readmissions for further care. Moreover, to evaluate the functionality of the consultation service, all patients who contacted the consultation phone service were followed up at 2 weeks after the call to record major complications (ie, any medical or surgical reason resulting in a hospital revisit or readmission) and any self-initiated ED visits made during the study time period, regardless of whether they were instructed to visit the ED.

## Results

A total of 362 phone calls were received by the consultation service during the study period. After exclusions, a total of 288 (79.6%) calls (185 individual patients) were included in the analysis (Fig. 1). Among the patients who contacted the phone consultation service, the mean age was 67.6 years (range, 20–90). Sixty-four percent ( $n = 185$ ) of the calls were made by women, 57% of the patients calling ( $n = 164$ ) had received TKAs, and 43% ( $n = 124$ ) had received THAs. Patients who had received primary THAs or TKAs comprised 90% of the calls, and the remaining 10% of calls were from patients who received revisions. The average hospital length of stay for patients who contacted the consultation service was 3 days, and calls were made an average of 20 days after discharge.

The 3 most common reasons for contacting the phone consultation service were medication, wound complications, and mobilization-related issues (Table 1). Of the calls categorized as medication-related issues, 28% involved insufficient pain

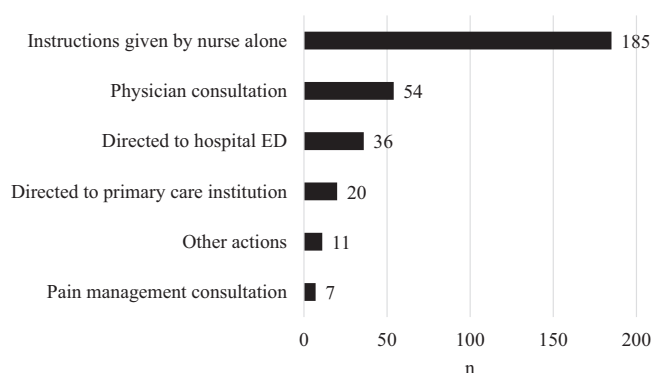
medication, 27% were questions regarding the use of prescribed medications, 13% were related specifically to anticoagulation medications (eg, international normalized ratio controls for warfarin or the duration of enoxaparin medication), and 8% were related to the patient running out of medication or experiencing potential side effects. Of the calls categorized as wound-related issues, 44% were miscellaneous questions about wound care, 41% were related to an infection suspicion, and 15% were related to bleeding or dehiscence. Mobilization-related issues concerned mostly overall stiffness or pain that occurred during ambulation.

Compared to patients with THAs, those with TKAs called nearly twice as often regarding medication-related issues. Among the medication-related calls, patients with TKAs complained about insufficient pain medication more often (34%) than patients with THAs (13%). In contrast, patients with THAs complained more often than patients with TKAs about swelling (14% THA vs 10% TKA), mobilization (16% THA vs 14% TKA), and wound-related problems (18% THA vs 16% TKA).

Among all calls from patients with primary and revision THA and TKA procedures, 26% of calls following a revision procedure resulted in an instruction to visit the hospital ED, and only 10% of calls following a primary procedure required direction to the ED. Most calls required no further action, other than instructions given by the nurse who answered the call (185 contacts, 64%; Fig. 2). For 19% of calls, the nurse consulted an orthopedic surgeon. Only 36 patients (13%) were advised to visit the hospital ED for further evaluation. Of these 36 patients, 14 (4.9% of study patients) were diagnosed with a condition that required treatment, including 3 deep vein thromboses and 5 surgical site infections (3 superficial and 2 deep). Of all 288 patients, 7% were directed to a primary healthcare center. A hospital nurse specialized in pain management was consulted in 2% of phone calls.

Twenty patients visited the ED without being instructed to do so by the nurse, within 2 weeks of calling the consultation service. Of these patients, only 2 were diagnosed with a condition that required treatment. Both patients had primary THAs and were diagnosed with surgical site infections. Irrigation and debridement were performed in both cases, and both received intravenous antibiotics.

Calls to the consultation phone service were predominantly received in the first weeks after discharge. Half of the calls were received within 2 weeks after discharge and 75% were received during the first postoperative month. Medication-related issues were the most frequent reasons for contact during the first weeks; mobilization-related issues increased in frequency during the second and third postoperative months.



**Fig. 2.** Actions taken to resolve the patient concerns. One call might have led to more than one action.

## Discussion

The present study successfully identified the main reasons for contacting the TJA consultation phone service after fast-track THA and TKA procedures. Identification of the most frequent postoperative patient concerns provided important information about areas to target in further endeavors to improve fast-track TJAs. On the basis of the present study, the most effective areas for further improvement and patient education seemed to be pain medication, wound treatment, and mobilization-related issues. Our results also demonstrated that the phone consultation service could efficiently address patient concerns and that this service might reduce the need for unnecessary ED visits after THA and TKA procedures. The consultation service worked well in detecting patients who required further evaluation, because the service only failed to direct patients to the ED in 2 cases that required further care.

Our results showed that over one-third of patients had questions about medication. In particular, after a TKA, patients often had questions about pain medication. Therefore, we should focus more on improving pain management. It was surprising to find that medication-related problems were the most common concern. Previous studies have not reported medication concerns, because they rarely lead to readmission [6–8]. However, some studies have shown that TKA patients generally experience more postoperative pain than THA patients [9,10]. These problems present a burden to the healthcare system, although the true financial consequences remain unknown. Many medication-related issues were resolved by informing the patient how to use pain medication appropriately. This finding indicated that there is room to improve perioperative patient education. Clear written instructions about anticoagulation medication should be given to all patients at discharge. Moreover, pain medications prescribed for use at home could be started during the primary admission to reduce the risk of side effects and to avoid confusion on how to use the drug. However, it should be noted that patient cognition and the patient's ability to adopt information during the short hospital stay might be suboptimal, due to strong pain medication [11]. Therefore, preoperative patient education, which has been shown beneficial [12,13], should be emphasized.

Our study also showed that wound-related concerns were common among patients with TJAs. In the present study, only one-third of these problems led to an ED visit. However, these problems can be difficult to evaluate by phone. One way to develop the consultation service in future would be to implement an Internet-based platform, where images could be sent for evaluation, or a video consultation could be conducted.

We found that patients reported mobilization-related problems mostly during the second and third postoperative month. This timing might be partly due to unrealistic expectations of recovery time. Only 2 patients were directed to the ED due to mobilization issues. This low rate might have resulted from the extensive preoperative and perioperative patient education provided at our institution.

More than two-thirds of calls were resolved by the answering nurse alone. This finding suggested that the consultation service might efficiently reduce unnecessary ED visits and total costs associated with TJAs. Only every eighth patient who contacted the consultation service was directed to the ED, and most of these directed patients had issues related to wound complications or edema. Early complications, such as surgical site infections or deep vein thromboses, were among the most common complications [14]. Therefore, patients with wound complications or excessive edema should be directed to the ED more readily. Conversely, medication-related questions rarely led to an ED visit; 98% of these issues were handled adequately by phone. By addressing these issues, the service might achieve substantial cost savings. Overall, the consultation service appeared to function well; only 2 patients who

required treatment were not correctly evaluated by phone. In the future, the use of wound images may provide higher sensitivity, because if the nurse had seen the wounds, these 2 patients would probably have been directed to the ED.

We found that most calls were received within 1 month after discharge. Thus, we should focus on improving early postoperative pain management. Moreover, we should further develop patient education, particularly regarding wound care and the expected recovery pattern after THA and TKA surgery.

The main strength of the present study was that every patient with TJA was carefully instructed at discharge, both verbally and with written instructions, on how and when to contact the consultation service. Therefore, we considered it unlikely that the average patient who experienced moderate concerns would have contacted another hospital; it was also unlikely that a considerable proportion of these patients would have contacted the hospital through other routes. We are also quite certain that every call received by the consultation service during the study period was carefully documented and accurately categorized. Therefore, our results reflected the actual concerns of patients with TJAs, and these results could be used as guidelines for reducing patient concerns after a TJA discharge. Furthermore, we were able to complete follow-ups on 100% of patients who used the consultation phone service. Therefore, we are confident that this study setting provided the appropriate approach for assessing the functionality of the consultation service.

This study had several limitations. First, this study did not capture all visits to the ED by patients with TJAs. For example, patients who experienced common post-TJA acute complications probably went directly to the ED, without first calling the consultation service. Even patients with less acute concerns might have visited the ED without first contacting the service. It is reasonable to assume that some patients who experienced concerns, particularly during the weekend, when the consultation phone service was not available, visited the ED or contacted the hospital through other routes, rather than wait until the next weekday. These possibilities could not be quantified in the present study. Therefore, our implication that the consultation phone service might reduce the number of unnecessary ED visits should be interpreted with some caution. Another limitation was that the reason for the phone consultation might have been misinterpreted, because only the answering nurse decided how to classify the call. We minimized this risk by giving careful instructions to the nurses who answered calls, and we implemented a test period before the actual study began. Furthermore, because the service was run by nurses and not the treating surgeons, there was a minor risk for incorrect information being passed along to the patients. To minimize this risk, only experienced arthroplasty nurses were allowed to run the service, and they were encouraged to keep a low threshold for consulting the treating surgeon.

## Conclusions

The results of this study showed that the TJA phone consultation service was useful. We found that most concerns were related to prescribed medications, wound complications, and mobilization-related issues. These issues should be targeted in future endeavors to improve TJA fast-track protocols. Our findings also suggested that this service may reduce the number of unnecessary ED visits.

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